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Effect of Static Dynamic and PNF Stretching with Specific Football Training Package on Agility of Football Players

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Abstract

The purpose of the study is to find out the effect of static, dynamic, and proprioceptive neuromuscular facilitation stretching with football training on agility of football players. To achieve the purpose of the study, forty eight male football players were randomly selected as subjects and their age ranged from 13 to 17 years. The selected subjects were randomly assigned into four equal groups of 12 subjects each. Group-I performed static stretching with football training, group-II performed dynamic stretching with football training, group-III assigned proprioceptive neuromuscular facilitation stretching with football training and group-IV was act as control. The selected biomotor variable agility was assessed by shuttle run. Random group design was used as experimental design. Training programme was administered to the football players for twelve weeks with six training units per week. The data collected from the four groups prior to and post experimentation on agility was statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since four groups are involved, whenever the obtained 'F' ratio value was found to be significant for adjusted post test means, the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases the level of confidence will be fixed at 0.05 for significance. The result of the study reveals that due to the effect of static, dynamic, and proprioceptive neuromuscular facilitation stretching with football training the agility of football players have significantly improved.

Keywords: Static, dynamic, and PNF stretching, Football training and Agility.

Introduction

Football is an extremely demanding sport. At an elite level, football players are often required to perform at their limits of speed, agility, flexibility, endurance and strength. On top of all of this, players must maintain a high state of concentration in order to meet the tactical/mental demands of dealing with their opponents. It is therefore essential that everyone involved with the modern game ought to be familiar with the skill requirements of the game. Static, dynamic, and proprioceptive neuromuscular facilitation stretching are the most competent ways to improve football game performance.

Stretching is often utilized for a wide variety of populations to be an essential part of a warm-up, which includes ballistic stretching, proprioceptive neuromuscular facilitation (PNF) stretching, static stretching (SS), and dynamic stretching (DS) (Ranna & Koslow, 1984; Sady, Wortman, & Blanke, 1982). Static stretching (SS) is described as gradually lengthening a muscle to an elongated position as tolerated to a point of discomfort, and holding position for a particular length of time. Traditionally, SS has been shown to increase the joint ROM, improve performance, and prevent injury (Bandy, Irion, & Briggler, 1997; Smith, 1994; Young & Behm, 2002). Dynamic stretching is defined as a controlled movement through the joint active range of motion while moving but not exceeding individual's extensibility limits (Fletcher & Jones, 2004). Some studies have demonstrated that DS exhibited similar increases in ROM as SS, while other authors suggested that SS created greater effects on ROM than DS (Bandy, Irion, & Briggler, 1998; Beedle & Mann, 2007; Herman & Smith, 2008).

Proprioceptive neuromuscular facilitation (PNF) stretching, defined as a combination of passive stretch and isometric contractions of the target muscle, is often utilized to increase the joint ROM, muscular strengthen, and neuromuscular control in a clinical and rehabilitation environment (Marek et al., 2005). Examining the changes on agility as a result of static, dynamic, and proprioceptive neuromuscular facilitation stretching with specific football training is a useful research objective. Therefore, the purpose of the present investigation was to examine and compare the effects of three different stretching exercises on agility of football players.

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Methodology

Selection of the Subjects

To achieve the purpose of the study, forty eight male football academy players from Chidambaram, Tamil Nadu, India were selected as subjects and their age ranged from 13 to 17 years. The selected subjects were randomly assigned into three experimental groups and a control group of 12 subjects each.

Selection of Variables

In this experimental study three independent variables such as static stretching with football training, dynamic Stretching with football training and Proprioceptive Neuromuscular Facilitation Stretching with football training are selected, while one group is kept control to assess the difference. The dependent variable selected for this study is agility and it was assessed by shuttle run.

Training Program

Training program was administered to the football players for twelve weeks with six training units per week. The experimental group-I performed static stretching with football training, group-II performed dynamic stretching with football training, group-III performed proprioceptive neuromuscular facilitation stretching with football training. The subjects of experimental groups performed these stretching exercises before performing the football training for the period of 12 weeks.

Experimental Design and Statistical Technique

Random group design is used as experimental design. The data collected from the four groups prior to and post experimentation on selected dependent variables is statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since four groups are involved, whenever the obtained 'F' ratio value is found to be significant for adjusted post test means, the Scheffe's test is applied as post hoc test to determine the paired mean differences, if any. In all the cases the level of confidence is fixed at 0.05 for significance.

Result

The descriptive analysis of the pre and post test data showing mean and standard deviation, range, mean differences and percentage of improvement on agility of experimental and control groups are presented in table-I.

Table I. Descriptive Analysis of the Pre and Post Test Data on Agility of Experimental and Control Groups

Group	Test	Mean	Standard Deviation	Range	Mean Differences	Percentage of changes
Static stretching group	Pre test	10.24	0.55	2.04	0.49	4.79%
	Posttest	9.76	0.54	1.95		
Dynamic stretching group	Pre test	10.25	0.58	1.97	0.89	8.68%
	Posttest	9.36	0.41	1.45		
PNF stretching group	Pre test	10.42	0.69	2.79	0.83	7.97%
	Posttest	9.59	0.48	1.56		
Control Group	Pre test	10.13	0.76	2.41	0.03	0.30%
	Posttest	10.16	0.75	2.34		

Table t-ratio at 0.05 level of confidence for 11 (df) =2.20
**Significant*

Table-I showed that the mean, standard deviation, range and mean difference, percentage of changes of the data collected from the experimental and control groups on agility. The percentage of changes in agility of static stretching with football training, dynamic stretching with football training, PNF stretching with football training and control groups are 4.79%, 8.68%, 7.97% and 0.30% respectively. The pre and post test data collected from the experimental and control groups on agility is statistically analyzed by using analysis of covariance and the results are presented in table–II.

Table II. Analysis of Covariance on Agility of Experimental and Control Groups

	Static Stretching	Dynamic Stretching	PNF Stretching	Control Group	S o V	Sum of Squares	df	Mean squares	'F' ratio
Pre test Mean	10.24	10.25	10.42	10.13	B	0.643	3	0.214	0.40
SD	0.55	0.58	0.69	0.76	W	23.64	44	0.537	
Post test Mean	9.76	9.36	9.59	10.16	B	5.105	3	1.702	4.27*
SD	0.54	0.41	0.48	0.75	W	17.554	44	0.399	
Adjusted Post test Mean	9.77	9.37	9.47	10.26	B	7.112	3	2.371	26.94*
					W	3.777	43	0.088	

(The required table value for significance at 0.05 level of confidence with degrees of freedom 3 and 44 is 2.82 and degree of freedom 3 and 43 is 2.82)
**Significant at .05 level of confidence*

Table-II shows that the pre-test means and standard deviation on agility of static, dynamic, and PNF stretching with football training and control groups are 10.24 ± 0.55, 10.25 ± 0.58, 10.42 ± 0.69 and 10.13 ± 0.76 respectively. The obtained 'F' ratio value is 0.40 of agility is less than the required table value of 2.82, it is said to be insignificant for the degrees of freedom 3 and 44 at 0.05 level of confidence. The post-test means and standard deviation on agility of static, dynamic, and PNF stretching with football training and control groups are 9.76 ± 0.54, 9.36 ± 0.41, 9.59 ± 0.48 and 10.16± 0.75 respectively. The obtained 'F' ratio value is 4.27 of agility is greater than the required table value of 2.82 and it is found to be statistically significant for the degrees of freedom 3 and 44 at 0.05 level of confidence. The adjusted post-test means on agility of static, dynamic, and PNF stretching with football training and control groups are 9.77, 9.37, 9.47 and 10.26 respectively. The obtained 'F' ratio value is 26.94 of agility is greater than the required table value of 2.82 and found to be significant for the degrees of freedom 3 and 43 at 0.05 level of confidence. The result of the study reveals that significant differences exist between the adjusted post test means of experimental and control groups on agility. To determine which of the paired means had a significant difference, the Scheffe's test was used as post-hoc test and the results are presented in the table-III.

Table III. Scheffe's Post Hoc Test for the Differences among Paired Means of Experimental and Control Groups on Agility

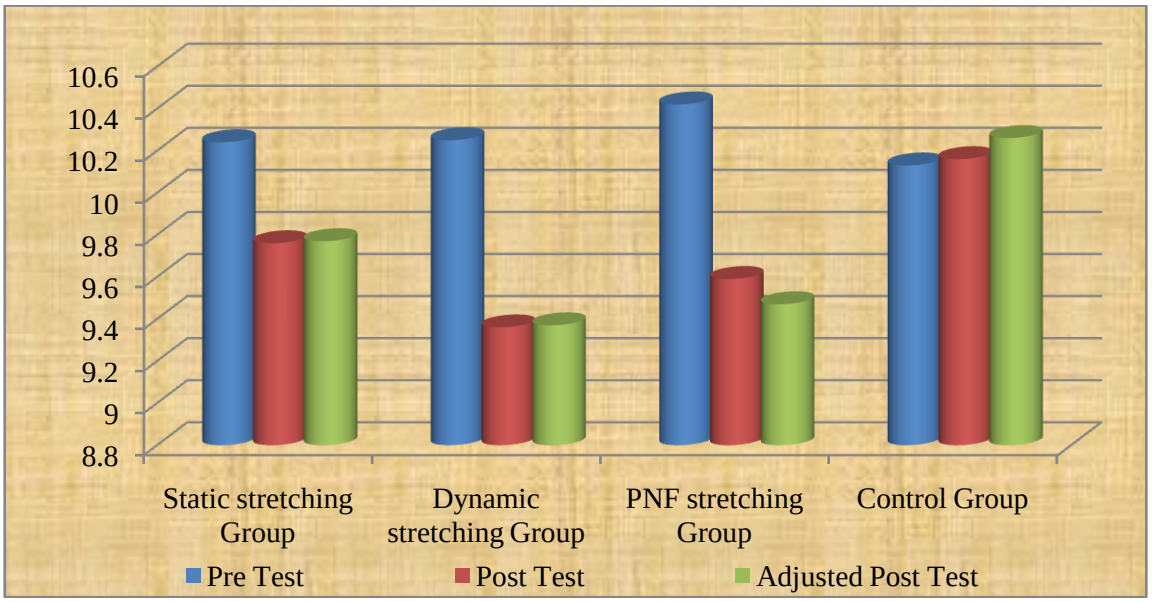
Static Stretching	Dynamic Stretching	PNF Stretching	Control Group	Mean Difference	Confidence Interval
9.77	9.37			0.40*	0.28
9.77		9.47		0.30*	0.28
9.77			10.26	0.49*	0.28
	9.37	9.47		0.10	0.28
	9.37		10.26	0.89*	0.28
		9.47	10.26	0.79*	0.28

**Significant at .05 level*

From table-III the Scheffe's post hoc analysis proved that significant mean differences existed between static and dynamic stretching groups, static and PNF stretching groups, static stretching and control groups, dynamic stretching and control groups, PNF stretching and control groups on agility since, the mean differences 0.40, 0.30, 0.49, 0.89 and 0.79 are higher than the confident interval value of 0.28 at 0.05 level of significance. However the mean differences between dynamic and PNF stretching groups is 0.10 which is lesser than the confident interval value of 0.28 at 0.05 level of significance. Hence, it is concluded that due to the effect of static, dynamic, and PNF stretching with football training the agility of the football player is

significantly improved. It is also concluded that dynamic and PNF stretching are significantly better than static stretching however, no significant differences existed between dynamic and PNF stretching in altering agility of the football players. For easy understanding the cylinder diagram is given below in figure-I.

Figure I. Diagram Showing the Mean Values on Agility of Experimental and Control Groups



Discussion

Recent research has indicated that stretching prior to athletic or sporting movements may have a detrimental effect on performance (Church et al., 2001; Nelson et al., 2001; Unick et al., 2005). Kokkonen et al., (1998) have studied the effect of warm ups on agility, sprinting and jumping performance in trained individual. They also have reported that a significant differences in sprint performance and no significant differences in agility and jumping performance (Kokkonen et al., 1997). Holt et al. in their study reported that dynamic warm up group enhanced muscular strength and agility (Holt, et al., 1970). Mcmillian et al., (2006) have studied on dynamic and static stretching warm up on power and agility performances. They indicated that dynamic warm up revealed better performance scores for all 3 performance tests (Mcmillian et al., 2006). Fletcher & Jones have studied on different stretching methods on sprint and agility. Their results revealed a significant decrease in agility time [22], little & Williams and O'Brien et al were agreement to this finding. Static stretching did not appear to be detrimental to agility performance when combined with dynamic warm up for professional soccer players. Dynamic stretching during the warm up was most effective as preparation for agility performance, and the results in these studies were conflicting to finding of this study (Little & Williams, 2006; O'Brıen et al., 1997), but methods of studying were different with PNF stretching protocol. Nevertheless, ballistic stretch has been reported to enhance performance in agility [Little & Williams, 2006; Mcmillian et al.,2006). Hence, the present study is in agreement with some of the studies found in the literature on the effect of prior stretching.

Conclusion

The result of the study reveals that due to the effect of static, dynamic and PNF stretching with football training the agility of the football players have significantly improved. Higher improvement in agility performance is observed by dynamic stretching with football training followed by PNF stretching and static stretching with football training. Therefore, these results may help recreational and professional athletes choose the most appropriate type of stretching exercise, before carrying out maximal anaerobic sports.

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